

ECE351: Signals and Systems I - Fall 2008 - Dr. Think Nguyen
Sample Midterm 1

1. Let

$$x(t) = \begin{cases} t, & 0 \leq t \leq 1 \\ 3 - 2t, & 1 \leq t \leq 2 \\ 0, & \text{otherwise} \end{cases}$$

- (a) Plot $x(t)$
- (b) Determine and plot the odd component $x_o(t)$ and even component $x_e(t)$ of $x(t)$
- (c) Is this a power or energy signal? Explain your answer.
- (d) Plot $y(t) = x(2t + 1)$

2. Let $x(t) = \cos(\frac{2}{5}t) + \sin(\frac{1}{5}t)$

- (a) Is $x(t)$ periodic? If so, find its fundamental period. If not, explain why?
- (b) If $y[n] = x(5n/2)$, i.e., $y[n]$ is the sampled signal of $x(t)$ at every interval $T = \frac{5}{2}$. Is $y[n]$ periodic? If so, find its fundamental period. If not, explain why?

3. Given an LTI system with the impulse response $h(t)$ is shown in Fig. 1.

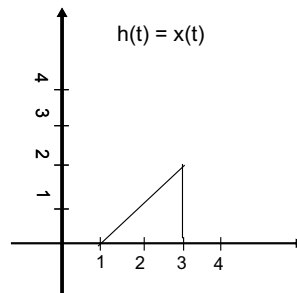


Figure 1: $x(t) = h(t)$

- (a) Determine whether $h(t)$ is BIBO stable? memoryless? causal? Explain your answer for each case.
- (b) Find the output $y(t)$ corresponding to an input signal $x(t) = h(t)$.